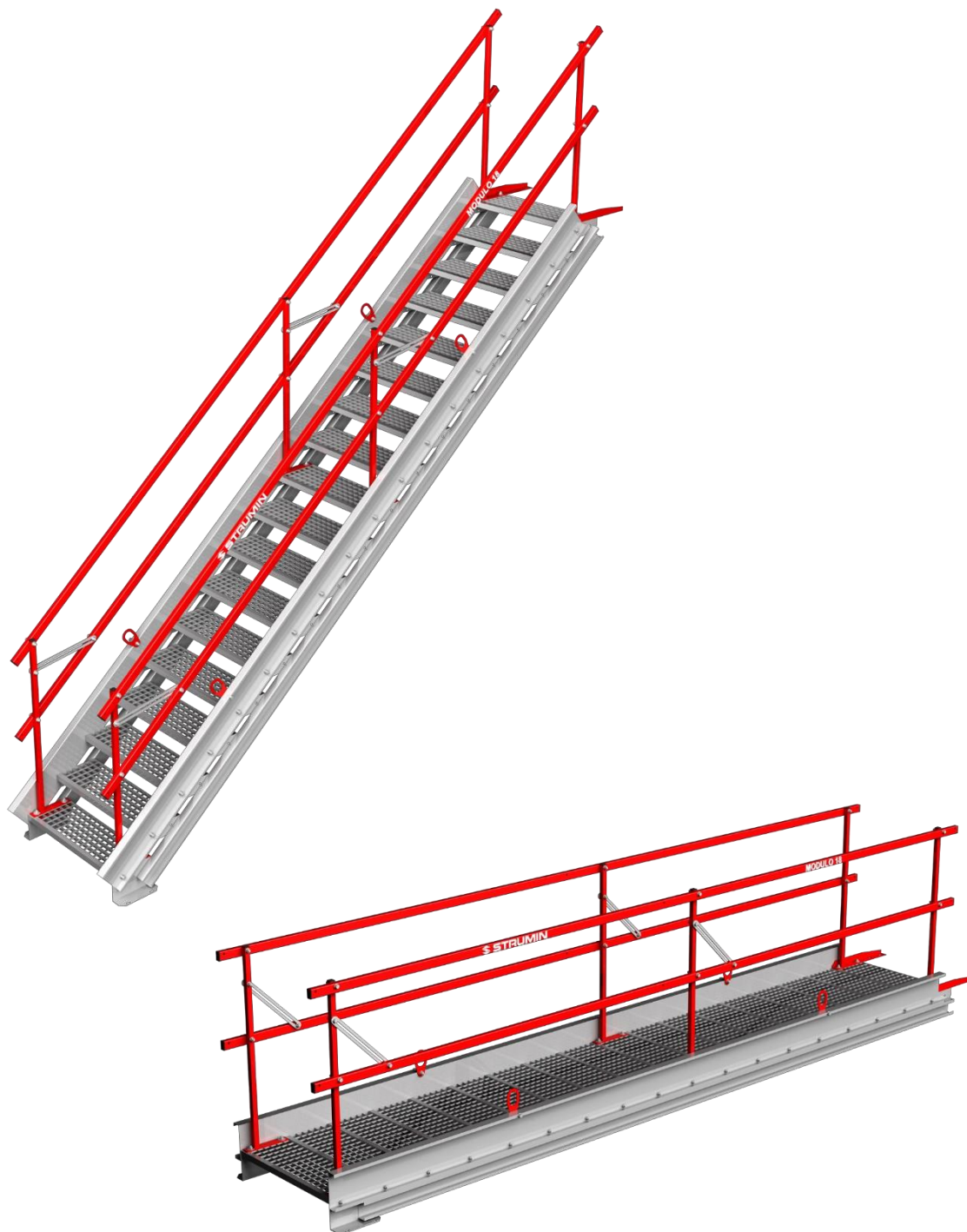# MODULO N STAIRWAYS – LOAD CAPACITY
SAFE WORKS AT HEIGHTS

CARRYING CAPACITY OF STAIRWAYS

The carrying capacity of stairways is defined by the resistance to bending of the supporting structure which they are part of Channel bars   C200 × 51 × 1.5   +   C100 × 51 × 1.5.

The calculations were performed in the ERSTAB

software.

BALK'S SCHEME (MODULO 18 STAIRWAYS)

4,80

Balk's parameters (C200 × 51 × 1.5)
- Bending resistance rate W_y = 44.55 cm3;
- Balk's weight m = 3.5 kg/m; load capacity rate for the balk's weight g_f = 1.1

BALK'S CHARACTERISTIC LOAD

P1: cw (g_f = 1.35)
Static scheme (the balk's weight automatically taken into account):

P2 case: usable (g_f = 1.5)
F load = 3 kN Static
scheme:

INTERNAL FORCES SCHEME

Envelope of external strengths

Bending moments [kNm]:

Deflections [mm]:

13.89

CROSS-SECTION STRESSES

$\sigma = M_y / W_y$ = 5400/ 0.00004455 = 121 MPa

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LOAD CAPACITY OF STAIRS

The load capacity of stairs is defined by the EN-ISO-14122-3_2016-08E standard, describing the load classes.
The standard defines six load classes.
In accordance with the criteria chosen by the producer of the platform gratings, the stairways comply with the requirements of all six classes when it comes to the load on the 200 × 200 mm surface₂ ❼ see the appendix „Tabela obciążeń krat wciskanych.pdf" (bearing bar dimensions 25 × 2 mm.)

Load classes table according to the EN-ISO-14122-3_2016-08E.

EN 12811-1:2003

Tablica 3 – Obciążenia eksploatacyjne w strefach roboczych (patrz także 6.2.2)

Klasa obciążenia	Obciążenie rozłożone równomiernie q_1 kN/m²	Obciążenie skupione na powierzchni 500 mm × 500 mm F_1 kN	Obciążenie skupione na powierzchni 200 mm × 200 mm F_2 kN	Obciążenie części powierzchni	
				q_2 kN/m²	Współczynnik części powierzchni a_p [1]
1	0,75 [2]	1,50	1,00	–	–
2	1,50	1,50	1,00	–	–
3	2,00	1,50	1,00	–	–
4	3,00	3,00	1,00	5,00	0,4
5	4,50	3,00	1,00	7,50	0,4
6	6,00	3,00	1,00	10,00	0,5

[1] Patrz 6.2.2.4.
[2] Patrz 6.2.2.1.

GENERAL STAIRWAYS LOAD CAPACITY 1 kN/m₂

To make the procedure of defining load capacity of different types of MODULO stairways easier, it is assumed that the maximum permitted load capacity in the least favourable position (horizontally) is 1 kN/m₂.
For example, MODULO 18 stairways have the surface of 4 m₂. It means that their maximum permitted load capacity is 4 kN.

General determination of load capacity poses the risk of wrong interpretation, because, for example, the 4 KN load capacity in the middle part of the staircase is not permitted for the MODULO 18, what comes from the assumptions described in "Balk's characteristic loads" part, where the calculated strength is 3 kN.
While calculating the general load capacity of stairways it shall be remembered that it describes only the approximate load capacity which is spread on different areas of 1 m surface₂.

MODULO SURFACE AREAS

Modulo 6 = 6*0.8*0.275 = 1.32 m₂.
Modulo 9 = 9*0.8*0.275 = 1.98 m₂.
Modulo 12 = 12*0.8*0.275 = 2.67 m₂.
Modulo 15 = 15*0.8*0.275 = 3.3 m₂.
Modulo 18 = 18*0.8*0.275 = 3.96 m₂.
Modulo 21 = 21*0.8*0.275 = 4.6 m₂.

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